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NEW SPECIES OF THE *BAIRDI* GROUP IN THE GENUS *COPIDOGNATHUS* (ACARI, HALACARIDAE)

Ilse Bartsch

ABSTRACT

Five species of the *bairdi* group of the genus *Copidognathus* were found in the Caribbean Sea and Gulf of Mexico. These were *Copidognathus bairdi* Newell, 1947, *C. gibberipes* Viets, 1936, *C. bairdiensis* new species, *C. glandulosus* new species, and *C. obesus* new species. *C. bairdiensis, C. glandulosus* and *C. obesus* are described here, and a key to the five species of the *bairdi* group is provided.

The cosmopolitan genus *Copidognathus* of marine mites has more than 180 species. The genus is known from intertidal habitats, from deep sea trenches, and from polar regions as well as from tropical waters. More than 50% of halacarid species found among gravel and coral debris, and in bushy calcareous algae, especially in warm waters, belong to the genus *Copidognathus.* In papers dealing with halacarid fauna of the Caribbean and Gulf region, Viets (1936) found that 8 of 11 halacarid species were members of the genus *Copidognathus,* and Newell (1947), 9 out of 15 species; in material recently studied, 28 halacarid species were found, 16 of them belonging to the genus *Copidognathus.*

Within the genus *Copidognathus* several natural groups of closely related species have been recognized. One of these groups, often represented in littoral warm water areas, is the *bairdi* group, named after *Copidognathus bairdi* Newell, 1947.

Characteristics of the *bairdi* group are: two pairs of conspicuous gland pores on posterodorsal plate, 2 or 4 longitudinal costae with rosette pores; ventral plates with numerous canaliculi near margins, canaliculi usually arranged around wide ostiae; ventral plates in males often fused; ovipositor short, slightly extending beyond genital opening; ejaculatory complex large, reaching to end or beyond anterior margin of genitoanal plate; telofemur I with none or only short lamellae; trochanters III and IV with no lamellar, pointed processes (as in the *lamellosus* group); genu IV with 4 setae; tibia IV ventrally with 2 slender, smooth setae; tarsus III and IV each with 4 dorsal setae.

Five species of the *Bairdi* group are found in the American tropical region, viz. *C. bairdi* Newell, 1947, *C. gibberipes* Viets, 1936, *C. bairdiensis* new species, *C. glandulosus* new species, and *C. obesus* new species.

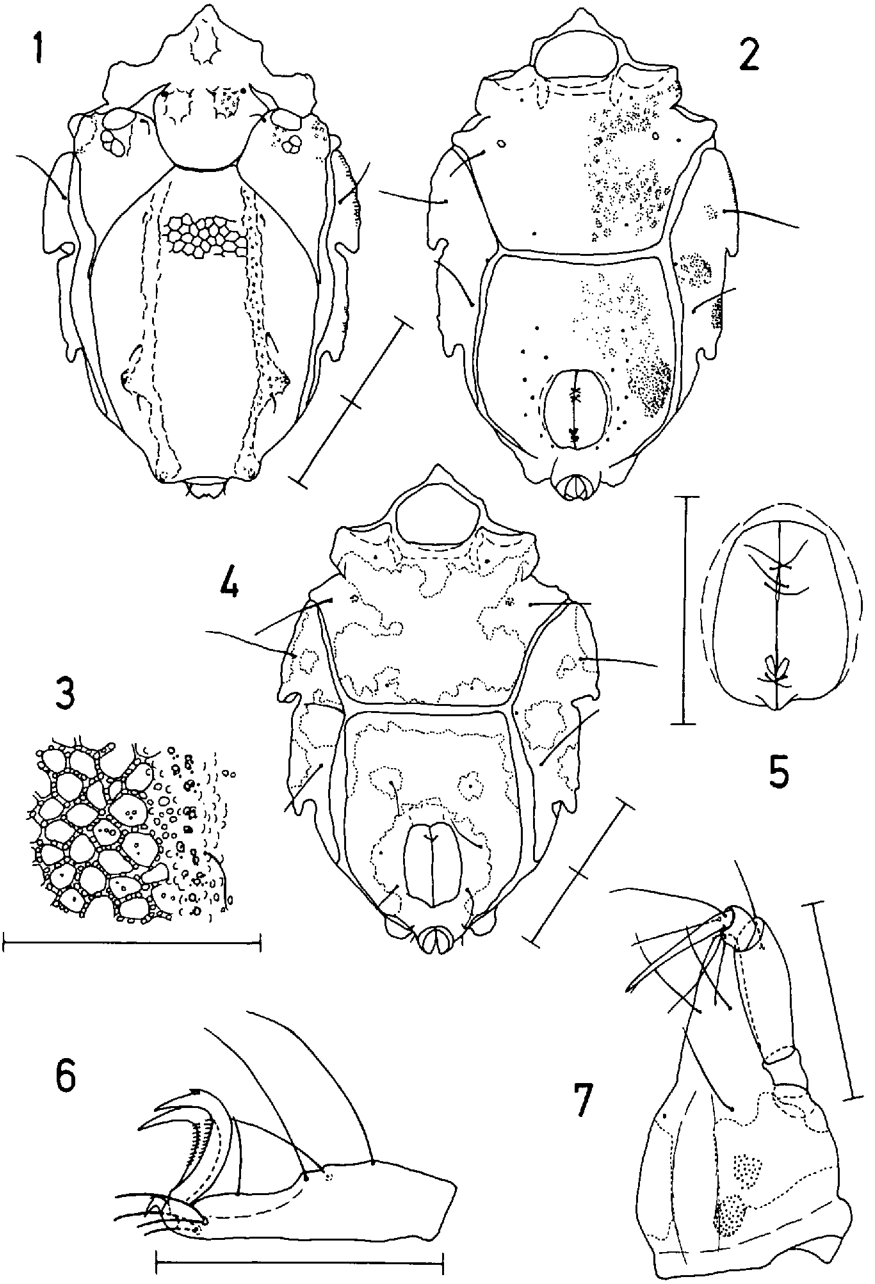
The species described in this paper were collected during the CARIBE I Program of the R/V ALPHA HELIX, a cruise funded by the National Science Foundation general ship support. The specimens will be deposited in the United States National Museum, Washington, D.C.

Copidognathus bairdi Newell, 1947

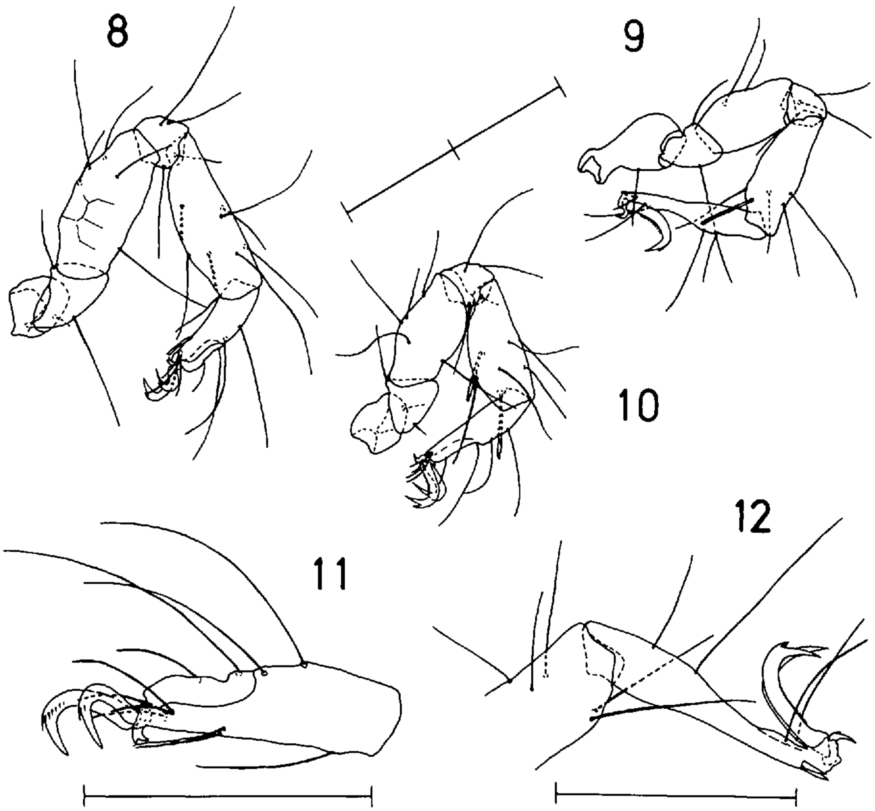
Material Examined.—1 female, 9°34.6′N, 78°43.2′W (Station MS-23-k), 0 m, 30 June 1977.

Description.—FEMALE. Length of idiosoma 290 μm. The characteristics of this female agree well with the description given in Newell (1947).

Distribution.—Caribbean and Gulf area; Galapagos Archipelago.



Figures 1–7. *Copidognathus bairdiensis* new species. 1, idiosoma, dorsal view, ♂; 2, idiosoma, ventral view, ♂; 3, portion of right posterodorsal plate at level of d-4, ♂; 4, idiosoma, ventral view, ♀ (porose areolae within dotted lines); 5, genital sclerites, ♂; 6, tarsus II, lateral view, ♀; 7, gnathosoma ventral view, ♀ (within dotted lines porose areolae). Scale equals 50 μm.

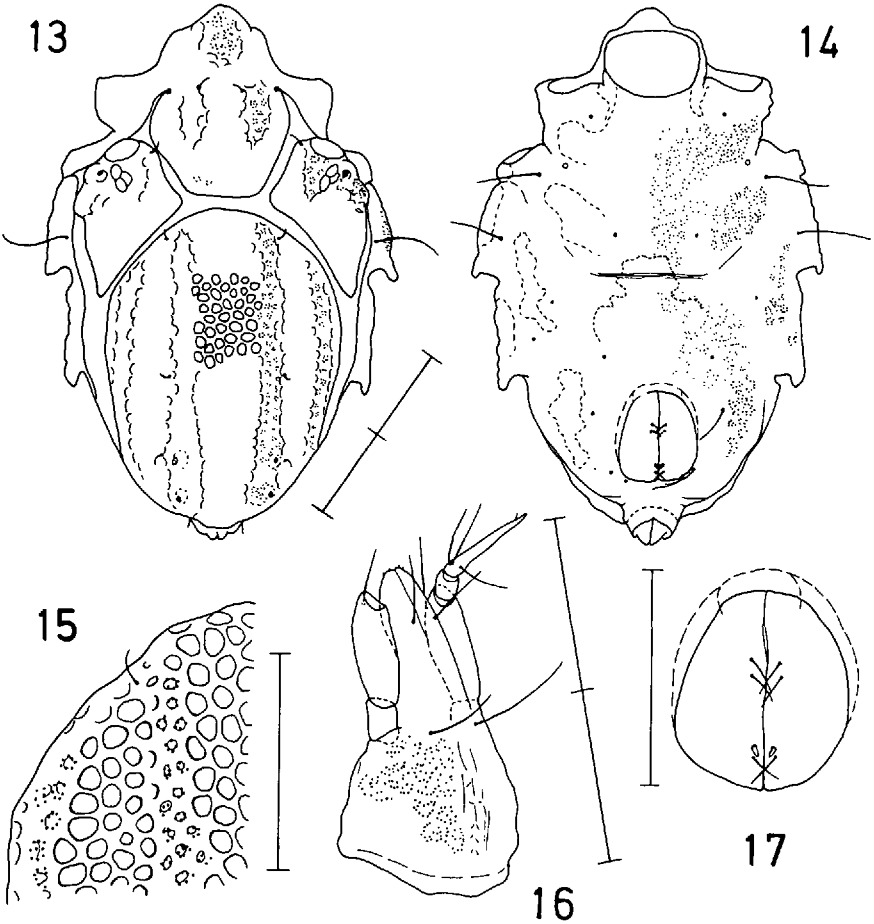


Figures 8–12. *Copidognathus bairdiensis* new species. 8, leg I, lateral view, ♀; 9, leg III, medial view, ♀; 10, leg II, lateral view, ♀; 11, tarsus I, medial view, ♀; 12, tibia and tarsus IV, lateral view, ♀. Scale equals 50 μm.

Copidognathus bairdiensis new species
Figures 1–12

Material Examined.—1 female (holotype), 1 male; 16°04.5′N, 87°59.2′W (Station MS-47-500, 0 m, 14 July 1977; 8°54.7′N, 77°41.0′W (Station MS-20-k), 5 m, 29 June 1977.

Description.—FEMALE. Length of idiosoma 285 μm. Dorsal plates outside of the porose areolae panelled; ribs of panels tuberose (Fig. 3). Anterodorsal plate (AD) with an anterior projection, 3 elevated porose areolae and posteriorly with few scattered pycnic rosette pores; a pair of small gland pores at lateral margin, anterolateral from paired porose areas; posterior half of plate sharply elevated. Ocular plates (OC) large, with lateral projections, thus very wide anteriorly; distally tapering and extending well beyond insertion of leg III. Anterior cornea large; posterior cornea divided into 3 cones. Porose areolae medial and lateral to corneae. A gland pore on lateral projection and a pore canaliculus at end of it. Posterodorsal plate (PD) slightly concave anteriorly; with 2 longitudinal costae, 1 to 2 rosette pores wide. Rosette pores with 4–7 canaliculi arranged around an alveolus, ostium lacking. Behind leg IV and at end of PD conspicuous cones, each with a gland pore. Dorsal setae fine, slender. First pair of dorsal setae (d-1) inserted on AD, anteromedial to paired porose areolae; d-2 on OC, medial to proximal cornea;



Figures 13–17. *Copidognathus glandulosus* new species, ♂. 13, idiosoma, dorsal view; 14, idiosoma, ventral view; 15, portion of left posterodorsal plate at level of d-3; 16, gnathosoma, ventral view; 17, genital sclerites. Scale equals 50 μm.

d-3, d-4, and d-5 on PD, at lateral edge of longitudinal costae, d-4 anterior to, d-5 at level of anterior gland pore.

Integument of ventral plates pierced by numerous fine canaliculi, except surroundings of ventral setae and epimeral pores where the integument is rather smooth (Fig. 2; Fig. 4). On ventral portion of plates canaliculi scattered, near margin of plates canaliculi often densely packed (Fig. 2). Epimeral processes inconspicuous. Setae on epimeral plates much longer than dorsal setae. Anterior epimeral plate with 3 pairs of setae; posterior epimeral plate with a long, stout dorsal seta and 3 slender ventral setae; genitoanal plate with 3 pairs of setae, inserted as illustrated (Fig. 4). A pair of minute setae on genital sclerites.

Base of gnathosoma ventrally and marginally porose, dorsally panelled. Epistome truncate. Rostrum extending almost to end of second palpal segment (p-2). Fourth palpal segment longer than p-2. First pair of maxillary setae on base of gnathosoma, second pair on rostrum. At tip of rostrum 2 pairs of minute setae. Rostral sulcus extending posteriad almost to second pair of maxillary setae (Fig. 7).

Telofemora and tibiae of legs finely porose; telofemur I laterally weakly panelled (Fig. 8). Small distal lamellae situated laterally and medially on telofemora, on genua and on tibiae, but no ventral lamellae present. Tibiae I and II ventrally each with 2 pectinate setae and 1 long, slender bristle. On tibia III ventromedially 1 pectinate, ventrolaterally 1 smooth, slender seta, on tibia IV 2 slender, smooth setae (Fig. 12). On tarsus I lateral membrane of claw fossa large, medial membrane shallow (Fig. 11); on tarsus II lateral membrane slightly larger than medial one; on the following tarsi both membranes small. Tarsus I with 3 dorsal fossary setae, a solenidion and canalicular profamulus on lateral membrane of claw fossa, 3 ventral setae and on tip of tarsus 2 doublet eupathidia (Fig. 11). Tarsus II with 3 dorsal setae, a solenidion on lateral membrane of claw fossa and a pair of doublet, eupathid parambulacral setae (pas) (Fig. 6). On tarsi III and IV 4 dorsal setae present; at tip of tarsus III medially a filiform pas, laterally a spinelike one; at tip of tarsus IV laterally and medially a short spinelike pas (Fig. 12). Leg chaetotaxy as illustrated in Figures 8–10. Leg IV similar to leg III except for: no seta on trochanter IV, 4 setae on genu IV.

On tarsus I lateral claws with an accessory tooth and few small teeth. On the other tarsi claws with a long comb with numerous fine teeth. Median claw small, bidentate.

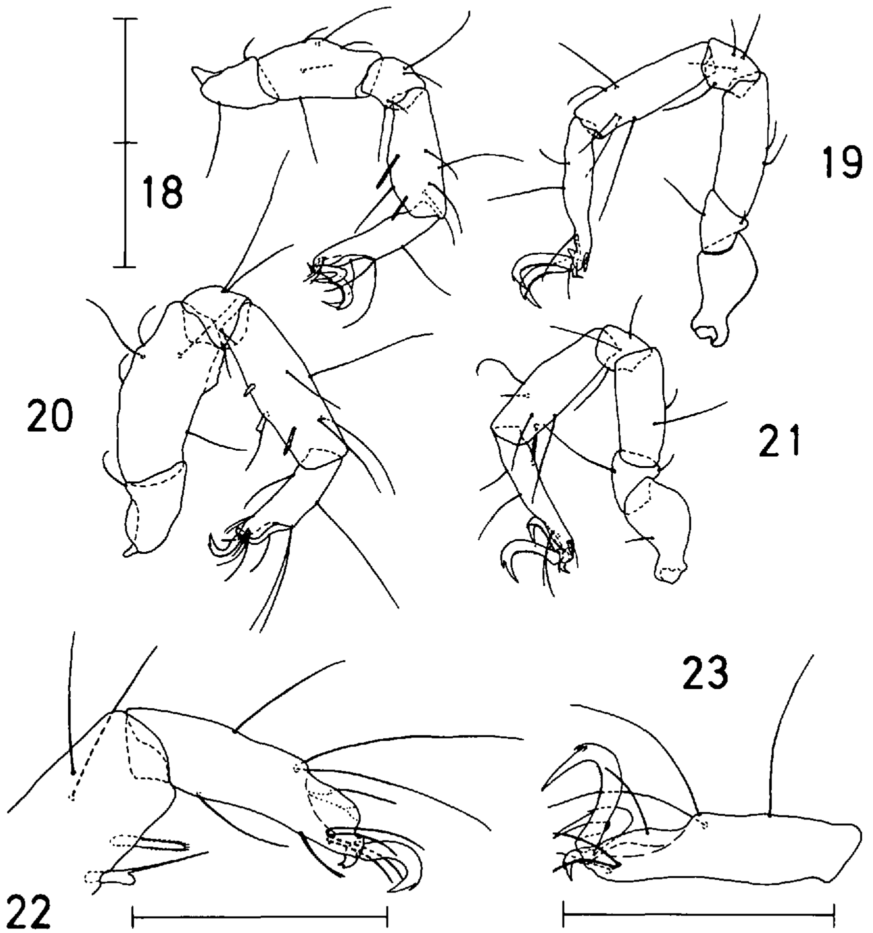
MALE. Length of idiosoma 251 μm. Male similar to female except for genitoanal plate (GA). Genital opening (GO) smaller than in the female. Distance from anterior end of GO to that of GA slightly more than length of GO (Fig. 2). GO surrounded by 17 perigenital setae. On genital sclerites 3 pairs of hair-like and 1 pair of spur-like subgenital setae (Fig. 5).

Remarks.—*Copidognathus bairdiensis* is very similar to *C. bairdi.* Both species are of almost the same length, with similar arrangement of porose areolae and similar ornamentation of dorsal and ventral plates, similar shape of gnathosoma and similar leg chaetotaxy. Distinguishing characters are: rosette pores on AD and OC in *C. bairdiensis* consisting of numerous canaliculi, while ostiae and alveoli are minute or lacking, whereas in *C. bairdi* there are large ostiae, and the canaliculi are almost fused with the alveoli; in *C. bairdiensis* only 2 longitudinal costae with rosette pores are on PD, with no further pores at margin of plate, while in *C. bairdi,* beside the pores on the 2 longitudinal costae, there are several rosette pores at margin of plate; in *C. bairdiensis* the gland cones on PD are larger than in *C. bairdi,* the posterior gland cones surpassing the idiosoma distally. In males of *C. bairdiensis* the ventral plates are separate, while in *C. bairdi* they are fused.

Copidognathus glandulosus new species
Figures 13–23

Material Examined.—1 male (holotype), 16°04.5′N, 87°59.2′W (Station MS-47-k), 0 m, 14 July 1977.

Description.—FEMALE. Not seen. MALE. Length of idiosoma 278 μm. With elevated porose areolae on dorsal plates, with the upper integument layers pierced by numerous fine canaliculi and, in deeper layers, alveoli. Outside porose areas plates panelled. Anterodorsal plate (AD) protruding anteriorly; 3 ovate porose areolae and few pycnic rosette pores at posterior margin; a pair of gland pores at margin of plate, lateral to paired porose areas. OC with lateral projections, thus wider in anterior portion; converging distally. Anterior cornea large, posterior cornea divided into 3 cones. Gland pore large, near lateral margin; more distally a minute pore canaliculus. Elevated areolae with rosette pores medial and lateral to posterior



Figures 18–23. *Copidognathus glandulosus* new species, ♂. 18, leg II, medial view; 19, leg IV, medial view; 20, leg I, medial view; 21, leg III, lateral view; 22, tibia and tarsus I, lateral view; 23, tarsus II, lateral view. Scale equals 50 μm.

cornea; distal porose area not surpassing pore canaliculus. PD convex anteriorly; 4 longitudinal costae, the median ones 2 rosette pores wide, the lateral ones just 1 rosette pore wide (Figs. 13, 15). Two pairs of large gland pores in distal portion of PD. Dorsal setae minute. First pair of dorsal setae (d-1) on AD, at anterior end of paired porose areolae; d-2 on margin of OC; just anterior to proximal gland pores. Adanal setae on base of anal papillae.

Anterior (AE), posterior (PE) epimeral plate and genitoanal plate (GA) fused, except some striae between AE and GA (Fig. 14). Numerous canaliculi piercing integument layers within ovate areolae on first and second epimeral plate, within oblong areas medial to leg III, within small areas proximal to leg IV, and on both sides of the genital opening. Outside these porose areas canalicular pores present which are not so deep. Genital opening large. Only 4 pairs of perigenital setae present (Fig. 14). Four pairs of subgenital setae on genital sclerites, with the 2 proximal ones hair-like, the next one spur-like, and the most distal one hair-like (Fig. 17). Ejaculatory complex extending anteriad beyond area of genitoanal plate.

Base of gnathosoma ventrally and marginally pierced by rather coarse pores, dorsally panelled. Rostrum rather long, extending just beyond third palpal segment (Fig. 16). A dorsal seta on second palpal segment, 3 basal setae and a minute distal one or fourth palpal segment. A pair of maxillary setae near base of rostrum and a pair on distal portion of rostrum. Rostral sulcus extending posteriad beyond second pair of maxillary setae.

Leg chaetotaxy as illustrated in Figures 18–21. Telofemur I with a short ventromedial carina (Fig. 20); on other telofemora only small distal lamellae present. Four setae on genu IV (Fig. 19). Of the 2 pectinate setae on tibia I the basal one very short, spur-like, the distal one slightly longer; slender ventral seta on tibia I with a basal knob (Fig. 22). On tibia II 2 ventromedial pectinate setae and 1 ventral smooth seta (Fig. 8). On tibia III ventromedial seta pectinate, ventral one smooth, and on tibia IV both setae smooth. Four dorsal setae on tarsi III and IV. On tip of tarsus III laterally a spur-like, and medially a hair-like, parambulacral seta (Fig. 21); both setae spur-like on tip of tarsus IV.

Lateral claws on tarsus I with an accessory tooth. On claws of the following legs a fine comb reaching to base of claw, with minute teeth. Median claw small, bidentate.

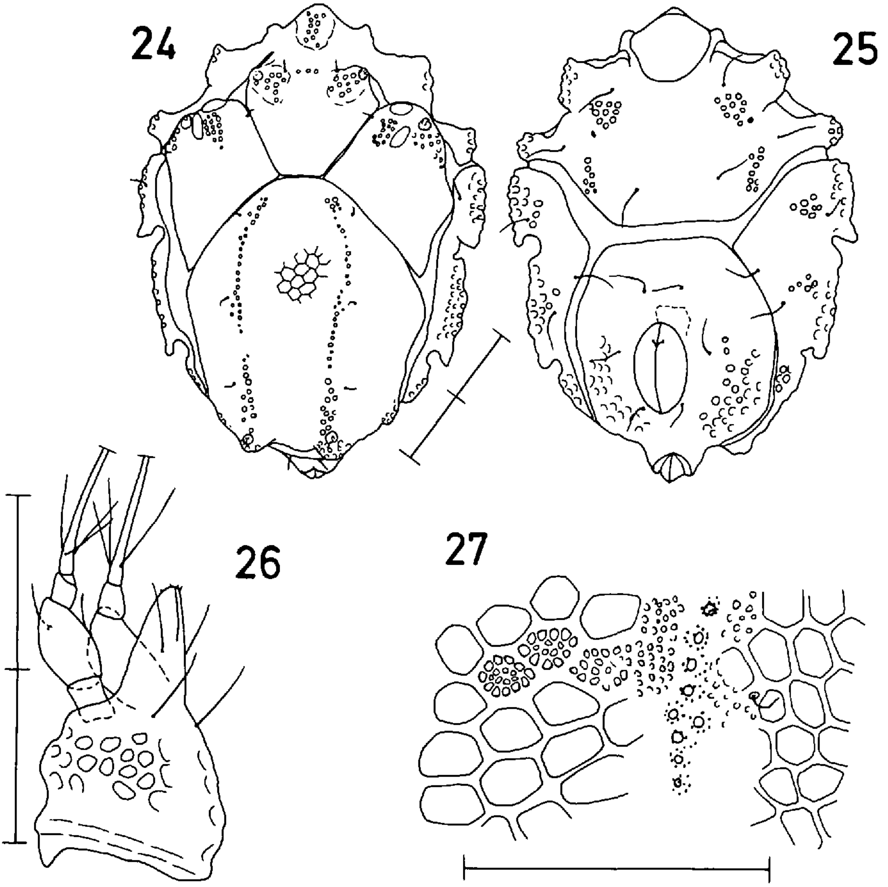
Remarks.—*Copidognathus glandulosus* is easily distinguished from other species of the *bairdi* group by: posterodorsal plate with 4 longitudinal costae; ventral plates in males fused except few striae between AE and GA; in males only 4 pairs of perigenital setae; rostrum surpassing third palpal segment; ventral seta on tibia I with a basal knob.

Copidognathus obesus new species
Figures 24–32

Material Examined.—1 female (holotype), 17°13.2'N, 88°16.5'W (Station PD-69-500), 25 m, 7 July 1977.

Description.—FEMALE. Length of idiosoma 304 μm. Dorsal plates covering almost all of dorsal idiosoma, membraneous areas greatly reduced. Elaborate areolae with rosette pores on dorsal plates (Fig. 24); areas on the plates outside of these areolae panelled, each panel subdivided into numerous small pores (Fig. 27). With 3 ovate porose areolae and few single rosette pores between the distal areolae on AD; anterior margin of plate protruding; 2 large gland pores at lateral margin of paired rosette pore areolae. OC very large, slightly longer than AD, widest at level of setae on posterior epimeral plate, extending distad well beyond insertion of leg III; 2 large corneae in anterior portion of ocular plate; porose areolae lateral and medial to distal cornea; 1 large gland pore and 1 pore canaliculus near lateral margin of plate. PD with 2 longitudinal costae with rosette pores and some pores at distal margin of plate, middle portion of the costae only 1 rosette pore wide, proximal and distal end 2 pores wide (Fig. 24). A pair of large gland pores in distal end of the costae. Second pair of gland pore not seen, perhaps obscured by rosette pores. Dorsal setae small. Setae d-1 on AD, at anterior margin of paired rosette pore areolae; d-2 on anteromedial margin of OC; d-3, d-4, and d-5 on PD, lateral to rosette pore costa.

Rosette pores on ventral plates within demarcated areolae (Fig. 25), with wide ostiae at surface and numerous fine canaliculi in deeper integument layers. Outside these areolae integument pierced by densely packed canaliculi; by low magnification a reticulation is discernible. Epimeral processes inconspicuous; AE with a pair of epimeral pores and 3 pairs of long setae, PE with 1 seta dorsally and 3

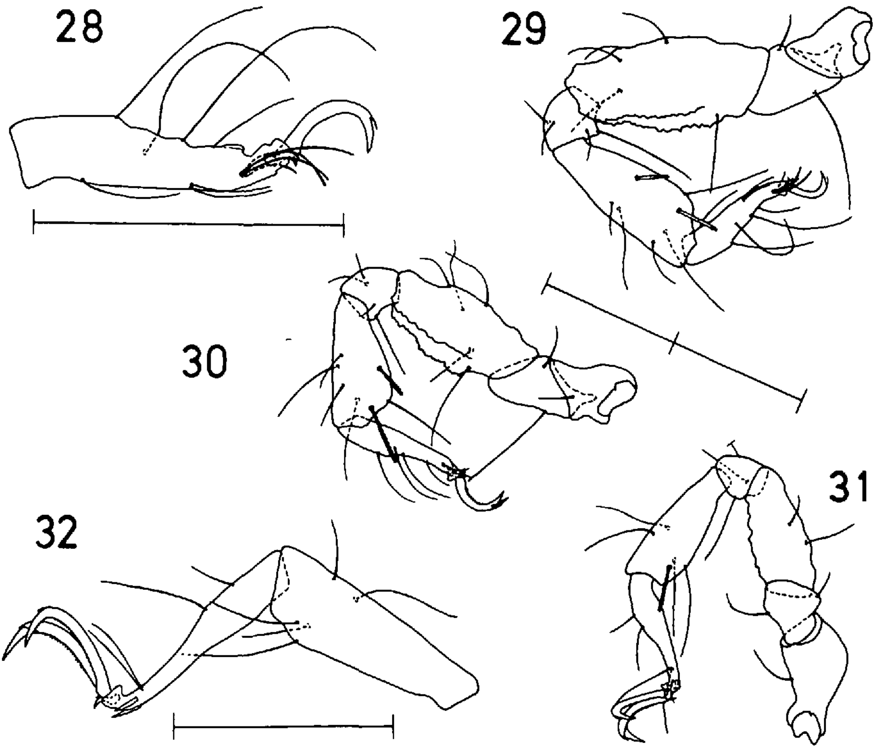


Figures 24–27. *Copidognathus obesus* new species, ♀. 24, idiosoma, dorsal view; 25, idiosoma, ventral view; 26, gnathosoma, lateral view; 27, portion of left posterodorsal plate at level of d-4. Scale equals 50 μm.

setae ventrally; GA with 3 pairs of perigenital setae and, on genital sclerites, 1 pair of fine setae. Ovipositor short, extending slightly beyond genital opening (Fig. 25).

Gnathosomatic base with large pores marginally, with numerous canaliculi in deeper integument layers. Rostrum extending to third palpal segment. A pair of long maxillary setae on base of gnathosoma, a pair in middle of rostrum, 2 pairs of minute setae at tip of rostrum. Epistome slightly protruding. Fourth palpal segment broken at tip, but still longer than second palpal segment.

Integument of legs with small shallow pores; telofemora slightly panelled. With shallow denticulate lamellae ventrolaterally and ventromedially on telofemora I and II (Figs. 29, 30). Two pectinate ventromedial and 1 long, smooth ventral seta both on tibia I and II, 1 pectinate and 1 long, smooth seta on tibia III, and 2 long, smooth setae on tibia IV (Fig. 32). Tarsus I with 3 long setae dorsally, 1 hair-like solenidion dorsolaterally, and 3 setae ventrally; at tip of tarsus, a pair of doublet parambulacral setae. On tarsus II 3 long setae dorsally, the dorsolateral one stouter than the dorsomedial one; dorsolaterally with 1 hair-like solenidion, on tip of tarsus a pair of single parambulacral setae. Tarsi III and IV each with



Figures 28–32. *Copidognathus obesus* new species, ♀. 28, tarsus I, lateral view; 29, leg I, medial view; 30, leg II, medial view; 31, leg III, medial view; 32, tibia and tarsus IV, medial view. Scale equals 50 μm.

4 dorsal setae; tip of tarsus III laterally with a spine-like and medially with a hair-like pas. Chaetotaxy of leg IV similar to that of leg III except: no seta on trochanter IV, 2 dorsal and 1 ventral seta on telofemur IV, and 4 setae on genu IV.

Lateral claws slender. On tarsi II, III and IV a long comb with numerous minute teeth. With only a few distal teeth on claws of tarsus I.

MALE. Not seen.

Remarks.—*Copidognathus obesus* is placed in the *bairdi* group though the second gland pore on the posterodorsal plate was not seen on the holotype, and on telofemur IV a ventral seta is present along with the 2 dorsal setae. *C. obesus* may be a link between the *bairdi* and the *curassiviensis* group.

Copidognathus obesus is distinguished from the other species by large and wide dorsal plates; OC longer than AD; only 2 longitudinal rib-like costae on PD; gland pores on PD at distal margin of plate; rosette pores on ventral plates within demarcated areas, integument outside these reticulate; telofemora I and II ventrolaterally and ventromedially with small denticulate lamellae.

DISTRIBUTION OF *BAIRDI* GROUP AND KEY

Eleven species are now known to belong to the *bairdi* group. *Copidognathus africanus* was collected with algae and sand on the sea shore near Knysna, South Africa (Bartsch, 1972), and off Kunduchi, Tanzania (Konnerth-Ionescu, 1977),

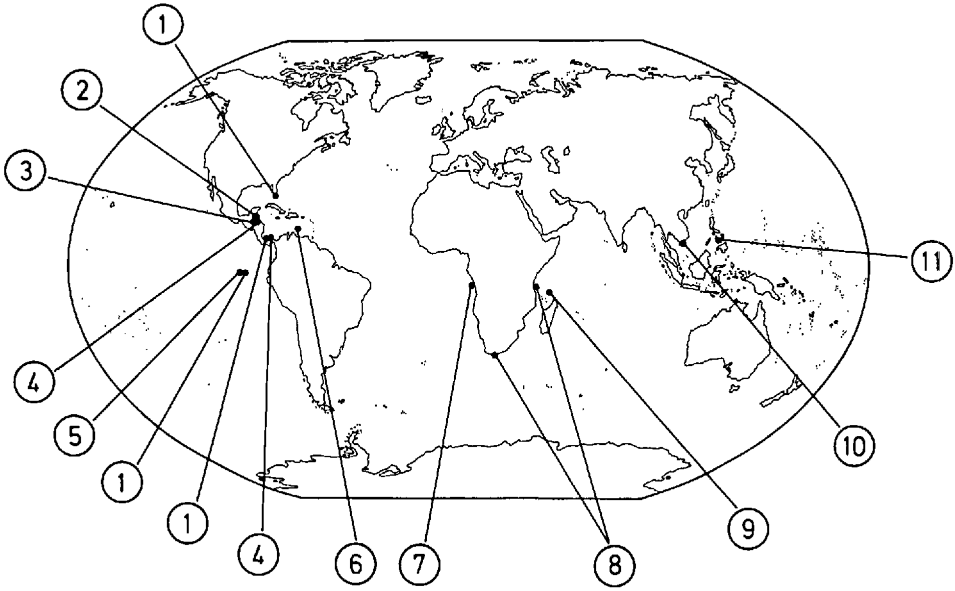


Figure 33. Geographical distribution of the *bairdi* group of the genus *Copidognathus*. 1, *bairdi*; 2, *obesus*; 3, *glandulosus*; 4, *bairdiensis*; 5, *grandiculus*; 6, *gibberipes*; 7, *frontispinus*; 8, *africanus*; 9, *sideus*; 10, *spinulus*; 11, undescribed species.

while *C. bairdi* was taken in intertidal habitats on both sides of Central America, off Florida (Newell, 1947), in the Caribbean Sea off Panama (present collection) and on the Galapagos Islands (Bartsch, 1977). *C. bairdiensis* was found in shallow waters in the Caribbean Sea, off Panama and Belize (present collection). *C. frontispinus* was described from boulders encrusted with algae, bryozoans and polychaetes south of Luanda, West Africa (Bartsch, 1972), *C. gibberipes* from algae and calcareous debris intertidally on Bonaire, Caribbean Sea (Viets, 1936), and *C. glandulosus* from shallow waters off Belize (present collection). *C. grandiculus* occurs on beaches of Santa Cruz, Galapagos Archipelago (Bartsch, 1977), *C. obesus* in shallow waters off Belize, Caribbean Sea (present collection), *C. sideus* in the northern Mozambique Channel at 110–440 m with sponges and alcyonarians (Bartsch, 1982), and *C. spinulus* off Vietnam (Trouessart, 1899). An undescribed species of the *bairdi* group was found in samples from a beach off Cebu, Philippines.

Since most mite collections are from intertidal and subtidal substrates, most records of the *bairdi* group are from these depths. However, as the finding of *C. sideus* exhibits, members of the *bairdi* group may also live in deeper waters.

According to the known records, members of the *bairdi* group are tropical and warm water species, usually inhabiting intertidal and shallow subtidal habitats. Even the South African record is from a shore usually influenced by the warm waters of the Angulhas current.

KEY TO THE FIVE SPECIES OF THE *COPIDOGNATHUS BAIRDI* GROUP IN THE CARIBBEAN SEA AND GULF OF MEXICO

1a. Proximal gland pore on PD well behind insertion of leg IV, distance to leg IV more than distance to distal gland pore 2

1b. Distance from proximal gland pore on PD to level of leg IV shorter than distance to distal gland pore 3
2a. PD with 4 costae with rosette pores .... *glandulosus* new species
2b. PD with 2 costae with rosette pores .... *obesus* new species
3a. PD with 4 costae; telofemur I with a tubercle-like ventral lamella; rostrum extending beyond third palpal segment .... *gibberipes* Viets
3b. PD with 2 costae and some single rosette pores marginally; ostiae distinct, canaliculi absent .... *bairdi* Newell
3c. PD with 2 costae; ostiae absent, canaliculi at surface .... *bardiensis* new species

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ADDRESS: *Biologische Anstalt Helgoland, Notkestr. 31, 2000 Hamburg 52, Federal Republic of Germany.*